Group A Streptococcus (Invasive)

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Invasive group A streptococcal disease is caused by the bacterium, *Streptococcus pyogenes.* There are over 100 serologically distinct types of *S. pyogenes* within group A.

B. Clinical Description

Pharyngitis (strep throat) is the most common result of infection with group A streptococcus (GAS). Skin infections (impetigo or pyoderma) are also common. However, in some cases the bacteria may become invasive and cause more severe illness. Invasive GAS may manifest as any of several clinical syndromes, including: 1) pneumonia, 2) bacteremia in association with cutaneous infection, 3) deep soft tissue infection (*i.e.*, necrotizing fasciitis [colloquially referred to as "flesh-eating bacteria"]), 4) meningitis, 5) peritonitis, 6) osteomylitis, 7) septic arthritis, 8) postpartum sepsis (*i.e.*, puerperal fever), 9) neonatal sepsis and 10) bacteremia. Case-fatality rates for some of these syndromes can be as high as 10–70%.

C. Reservoirs

Humans are the only reservoir for *S. pyogenes*.

D. Modes of Transmission

The modes of transmission of GAS bacteria are large respiratory droplets and person-to-person spread through direct contact with patients or carriers. Indirect person-to-person spread through objects can sometimes transmit GAS bacteria as well. Nasal, throat, skin, anal and vaginal carriers can all serve as sources of GAS infection.

E. Incubation Period

The incubation period for GAS pharyngitis is usually short, 1 to 5 days, but rarely longer. The incubation period for invasive GAS disease is variable.

F. Period of Communicability or Infectious Period

In untreated, uncomplicated GAS disease, the infectious period starts several days before onset of symptoms and lasts from 10 to 21 days. If purulent discharges are present, the infectious period may be extended to weeks to months. Persons with untreated GAS pharyngitis may carry and transmit the bacteria for weeks or months, with sharply decreasing contagiousness 2 to 3 weeks after illness onset.

G. Epidemiology

Estimates of the annual incidence rates of invasive GAS in North America have ranged from 1.5 to 7.0 cases per 100,000. In the United States, the Centers for Disease Control and Prevention (CDC) estimates the rate to be 3.3 cases per 100,000. Of the estimated 10,000–15,000 cases of invasive GAS in the US each year, between 500 and 1500 cases develop necrotizing fasciitis. Surveillance studies have suggested that 85% of cases occur sporadically in the community, 10% are hospital-acquired, 4% occur in long-term care facilities and 1% occur after close contact with a case. Nosocomial outbreaks and cases of invasive GAS have been traced to healthcare workers who were anal, vaginal, skin or throat carriers of GAS.

Invasive GAS occurs year-round with a peak incidence reported from December through March. People who have chronic cardiac or pulmonary disease, diabetes mellitus or HIV infection, or who inject drugs or abuse alcohol are believed to be at higher risk for invasive GAS infection. In children, varicella infection has been identified as a significant risk factor. Infection with GAS may be followed by the non-infectious complication of rheumatic fever (characterized by arthritic, cardiac, neurologic signs and symptoms) or glomerulonephritis (inflammation of the kidney will affect kidney function). One goal of treating cases (with at least 10 days of antibiotic therapy) is to prevent these sequelae.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. What to Report to the Massachusetts Department of Public Health

- Isolation of group A streptococcus (*S. pyogenes*) by culture from a normally sterile site (*e.g.*, blood or cerebrospinal fluid or, less commonly, joint, pleural, or pericardial fluid). *Note:* See Section 3) C below for information on how to report a case.

B. Laboratory Testing Services Available

The Massachusetts State Laboratory Institute (SLI), Reference Laboratory will test specimens for the presence of group A streptococci. In some outbreak circumstances isolates may be sent to CDC for typing. For more information on submitting specimens contact the Reference Laboratory at (617) 983-6607.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify close contacts of the case and provide recommendations for appropriate preventive measures and thus prevent infection and complications in the contacts and further spread of infection.
- To provide information about the disease, its transmission, and methods of prevention.
- To promptly identify clusters or outbreaks of disease in order to initiate appropriate prevention and control measures. If an outbreak of invasive GAS is identified in a community or organization such as a school or daycare center, varicella vaccination might be recommended if cases are associated with chickenpox, or prophylactic antibiotics might be recommended to certain groups depending on the number of cases and the community or organization involved.

B. Laboratory and Healthcare Provider Reporting Requirements

The Massachusetts Department of Public Health (MDPH) requests that laboratories report to the local board of health, in the community where diagnosed, all invasive cases of GAS (by telephone, confidential fax or in writing). A case of invasive GAS is defined by the reporting criteria in Section 2) A above. Please refer to the lists of reportable diseases (at the end of this manual's introductory section) for specific information.

C. Local Board of Health Responsibilities

1. **Reporting Requirements**

The MDPH requests that each local board of health (LBOH) report any case of invasive group A streptococcus, as defined by the reporting criteria in Section 2) A above, to the MDPH Division of Epidemiology and Immunization, Surveillance Program using an official MDPH *Invasive Group A Case Report Form* (in Appendix A). Refer to the *Local Board of Health Reporting Timeline* (at the end of this manual's introductory section) for information on prioritization and timeliness requirements of reporting and case investigation.

2. **Case Investigation**

a. It is requested that the LBOH complete a MDPH *Invasive Group A Strep Case Report* form (in Appendix A) by interviewing the case and others who may be able to provide pertinent information. Much of the information required on the form can be obtained from the case's healthcare provider or the medical record.

b. Use the following guidelines to assist you in completing the form:
   1) Accurately record the demographic information.
   2) Accurately record clinical information, including date of symptom onset, whether hospitalized (and associated hospital information and dates), and other medical information.
   3) Indicate the type of infection caused by GAS.
   4) Indicate the type of specimen from which GAS was isolated/identified (*e.g.*, blood, CSF).
   5) Note the date of the first positive culture.
   6) Ask about varicella history because invasive GAS may be a complication of a prior varicella infection.
   7) If you have made several attempts to obtain case information, but have been unsuccessful (*e.g.*, the case or healthcare provider does not return your calls or respond to a letter, or the case refuses to divulge

information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason why it could not be filled out completely.

c. After completing the form, attach lab report(s) and mail (in an envelope marked "Confidential") to the MDPH Division of Epidemiology and Immunization, Surveillance Program. The mailing address is:
MDPH, Division of Epidemiology and Immunization
Surveillance Program, Room 241
305 South Street
Jamaica Plain, MA 02130

d. Institution of disease control measures is an integral part of case investigation. It is the LBOH responsibility to understand, and, if necessary, institute the control guidelines listed below in Section 4), Controlling Further Spread.

4) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (*105 CMR 300.200*)

None.

B. Protection of Contacts of a Case

Depending on the number of cases of invasive GAS, in certain settings or situations recommendations may include antibiotic prophylaxis for potential carriers, varicella vaccination for susceptible children, and throat cultures for contacts of cases. See Section 4) C, Managing Special Situations, directly below.

C. Managing Special Situations

Daycare

One case of invasive GAS in a daycare is not usually a cause for alarm. However, to determine the extent of the situation the following questions should be posed:

- Was the case's illness preceded by varicella infection?
- Have any varicella cases been reported in the daycare in the previous 2 weeks? If so, how many and what were the dates of onset?
- Have any cases of pharyngitis or impetigo been reported at the daycare in the previous 2 weeks? If so, how many and what were the dates of onset?

The recommendations for control will depend on the answers to these questions. The Division of Epidemiology and Immunization has a document entitled *Group A Strep and Varicella Control Guidelines* that contains comprehensive information on how to respond to one or more cases of invasive GAS in daycare. In addition, please contact the Division to report suspect or confirmed cases in a daycare (or any other setting). An epidemiologist will work with you to ensure all contacts are identified and notified. In addition, surveillance data are necessary to determine the presence of an outbreak or cluster of cases of disease.

School

As described above for daycare, one case of invasive GAS in a school is not necessarily a cause for alarm. And while GAS is much more likely to spread in a daycare setting, you still need to determine if the case recently had varicella and how many cases of pharyngitis, impetigo and varicella are occurring in the school. As in a daycare, the recommendations for control will depend on the answers to these questions. The Division of Epidemiology and Immunization has a document entitled *Group A Strep and Varicella Control Guidelines* that contains comprehensive information on how to respond to one or more cases of invasive GAS in a school.

Hospital

GAS is an unusual cause of surgical site or post-partum infections. The bacterium is only isolated from <1% of surgical-site infections and 3% of infections after vaginal delivery. Since most nosocomial transmission is traced to carriers involved in direct patient care, even one case of post-operative or post-partum GAS should be vigorously investigated. Usually the infection control practitioner (ICP) or hospital epidemiologist will investigate to find a possible carrier. Investigations usually consist of medical and laboratory record reviews,

further testing of the GAS isolates, screening healthcare workers from multiple sites, and sometimes environmental testing.

Long-Term Care Facilities
Cases of invasive GAS infection in a long-term care facility, while rare, sometimes do occur. Steps should be taken to rule out the possibility of a more widespread problem. Surveillance should be done on the floor where the case resides for other residents with possible symptoms of GAS infection, such as fever or sore throat. These residents should be tested for GAS infection and treated if positive. Additional cases of invasive GAS would require a more vigorous response. An MDPH epidemiologist will work with you to determine the best prevention and control measures to implement and how to proceed with a more rigorous investigation. This might involve screening healthcare workers and asymptomatic residents, and perhaps environmental testing.

Reported Incidence Is Higher than Usual/Outbreak Suspected
If the number of reported cases in your city/town is higher than usual, or if you suspect an outbreak in a school, daycare, hospital or long-term care facility, please contact the Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 as soon as possible. This situation may warrant an investigation of clustered cases to determine a course of action to prevent further cases. The Division can also perform surveillance for cases that cross several town lines and therefore be difficult to identify at a local level.

D. Preventive Measures

Environmental Measures
Advise daycare centers to clean toys daily using an approved disinfectant (an EPA-registered sanitizing solution safe for use in the daycare setting) and to discourage the use of play food, which facilitates the transmission of not only this bacterium but many others as well. The MDPH *Health & Safety in Child Care Manual* has more detailed information on creating a healthful environment.

Personal Preventive Measures/Education
To avoid future exposures, advise individuals to:
- Practice good hygiene and frequent handwashing
- Avoid sharing food, beverages, cigarettes or eating utensils
- Receive varicella vaccine if susceptible (see the "Chickenpox and Shingles" chapter for more information).

ADDITIONAL INFORMATION

The formal CDC surveillance case definition for invasive GAS disease is the same as the criteria outlined in Section 2) A of this chapter. (CDC case definitions are used by the MDPH and CDC to maintain uniform standards for national reporting.) For reporting to the MDPH, always refer to the criteria in Section 2) A.

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